

CLAIMS

We claim:

1. Method for evaluating a network, comprising the steps of:

measuring average message delay through said network;

determining the standard deviation of said message delay; and

calculating the discrete utilization of said network as the ratio of said average message delay to said standard deviation.

2. The method of claim 1, further comprising the steps of:

factoring instances of dropped messages as full

utilization in calculating said discrete utilization.

1 3. Method for evaluating a network, comprising the steps
2 of:

3 communicating of a plurality of long packets and short
4 packets through said network;

5 determining the best time of said long packets;

6 determining the best time of said short packets;

7 responsive to the length of said long and short packets
8 and their respective best times, determining network
9 Network Queue Wait Time (Tw) and the Standard Deviation
10 of Network Queue Wait Time, (σTw);

11 responsive to said Tw and σTw , calculating the discrete
12 utilization (p) of said network.

1 4. The method of claim 3, wherein said Tw, σTw and p are
2 related by the expression:

3
4
$$Tw / \sigma Tw = p / \sqrt{(p * (2 - p))} .$$

1 5. Method for evaluating a network, comprising the steps
2 of:

3 sending test packets across said network;

4 responsive to said test packets, deducing the capacity
5 of said network, its latency, and the current
6 utilization of said capacity.

1 6. The method of claim 5, further comprising the steps of:

2 calculating network hop count as a measure of the
3 minimum number of hops of network bottleneck hop speed
4 that could be in the actual network; and

5 responsive to said network hop count, determining the
6 minimum network discrete utilization.

1 7. The method of claim 6, further comprising the steps of:

2 responsive to said test packets, determining as a
3 maximum network discrete utilization the number of

4 messages queued per network hop count; and

5 responsive to said minimum network discrete utilization

6 and said maximum network discrete utilization,

7 determining a best approximation of end to end discrete

8 utilization.

1 8. The method of claim 7, further comprising the step of:

2 adjusting said end to end discrete utilization for

3 dropped test packets.

1 9. The method of claim 7, said best approximation of end

2 to end discrete utilization being the average of said

3 minimum network discrete utilization and said maximum

4 network discrete utilization.

1 10. The method of claim 7, further comprising the step of:

2 adjusting said best approximation of end to end

3 discrete utilization by selectively weighting said

4 minimum network discrete utilization or said maximum
5 network discrete utilization responsive to network
6 streaming utilization.

1 11. A method for evaluating network characteristics,
2 comprising the steps of

3 determining network utilization;

4 determining average message service time; and

5 calculating the standard deviation of network queue
6 wait time (σTw) = square root of (utilization * (2-
7 utilization)) * (average message service time / (1 -
8 utilization)).

1 12. The method of claim 11, further comprising the step of

2 determining $Tw = \text{utilization} * \text{average message service}$
3 $\text{time} / (1 - \text{utilization}).$

1 13. A method for evaluating the discrete utilization of a
2 network, comprising the steps of

3 transmitting through said network and time stamping
4 probative samples; and

5 responsive to said samples, calculating the average
6 wait time and the standard deviation of average delay
7 of said network.

1 14. The method of claim 13, said samples comprising one way
2 echo packets.

1 15. The method of claim 13, said samples comprising two way
2 echo packets.

1 16. The method of claim 13 for deriving the discrete
2 utilization of a network, further comprising the steps of:

3 deriving said discrete utilization as the ratio of the
4 wait time of said network to the standard deviation of

5 the average queue wait time.

1 17. The method of claim 16, further comprising the
2 steps of:

3 fine tuning said discrete utilization by averaging
4 dropped instances of said samples with successful
5 transmissions of said samples to derive a measure of
6 discrete utilization based upon a total set of said
7 probative samples.

1 18. System for evaluating a network, comprising:

2 an apparent network speed analysis application for
3 measuring average message delay through said network;
4 determining the standard deviation of said message
5 delay; and

6 calculating the discrete utilization of said network as
7 the ratio of said average message delay to said
8 standard deviation; and

9 a service level and capacity planning routine for
10 tuning said network.

1 19. The system of claim 18, said service level and capacity
2 planning routine further for calculating change in network
3 traffic before network response time service level is
4 compromised; determining additional file load capacity of
5 the network; and adjusting window size for file transfer to
6 fill remaining capacity.

1 20. System for evaluating a network, comprising:

2 a first program module for measuring average message
3 delay through said network;

4 a second program module for determining the standard
5 deviation of said message delay; and

6 a third program module for calculating the discrete
7 utilization of said network as the ratio of said
8 average message delay to said standard deviation.

1 21. A program storage device readable by a machine,
2 tangibly embodying a program of instructions executable by a
3 machine to perform method steps for evaluating a network,
4 said method steps comprising:

5 measuring average message delay through said network;

6 determining the standard deviation of said message
7 delay; and

8 calculating the discrete utilization of said network as
9 the ratio of said average message delay to said
10 standard deviation.

1 22. A computer program product or computer program element
2 for performing the steps of:

3 measuring average message delay through said network;

4 determining the standard deviation of said message
5 delay; and

6 calculating the discrete utilization of said network as

